Psychosocial traits of children identified "at risk" for language delay by the Spanish MacArthur-CDI

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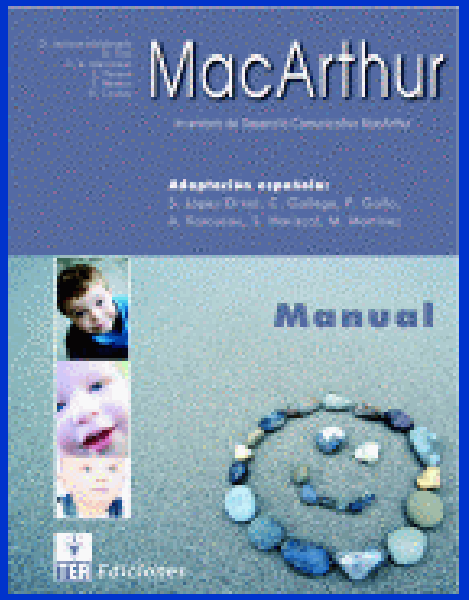
EQUIAL



http://www.ucm.es/info/equial/

López Ornat, S., Gallego, C., Karousou, A., Gallo, P., Mariscal, S. & Martínez, M. (2005) *Inventarios de Desarrollo Comunicativo MacArthur. Adaptación española.* Madrid: TEA, Ediciones.

What we know about validity of MCDI Inventories …

- * Good validity as a language assessing instrument => studies of concurrent and predictive validity in different languages.

- * Good description of communicative & linguistic abilities of children with:
  - Language Delay (Bonifacio e Zocconi, 2002; Chilosi et al., 1998; Cipriani et al. 2002; Smoczynska, 2005 ….)
  - Specific Language Impairment (Thal et al., 1999 …)
  - Down Syndrome (Caselli et al., 1998, 2006; Galeote et al., 2005; …)
  - Hearing-impairment, after cochlear implantation
  - Autism Spectrum Disorders
  - Williams Syndrome (Vicari et al., 2002, 2004; Volterra et al., 2003 …)

But we also know ….

- * Extremely high variability of the language acquisition process.

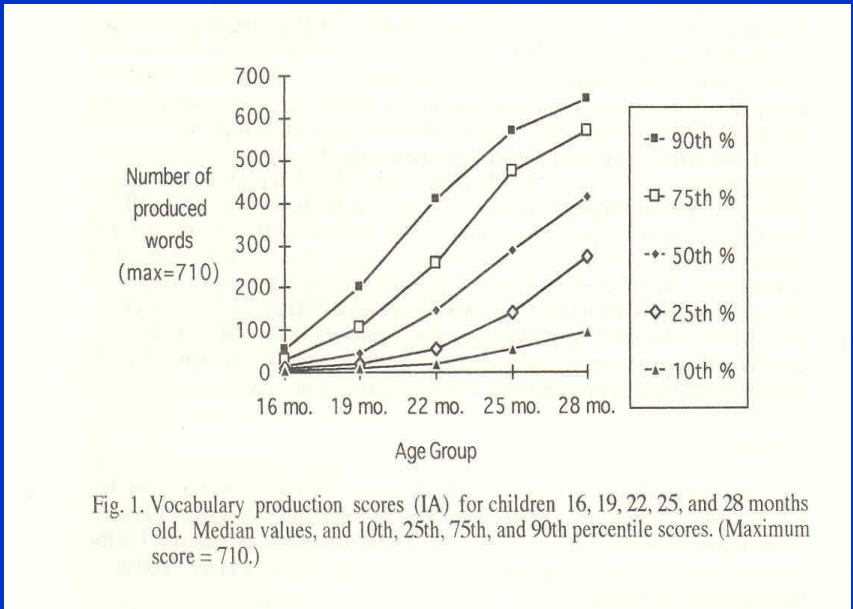
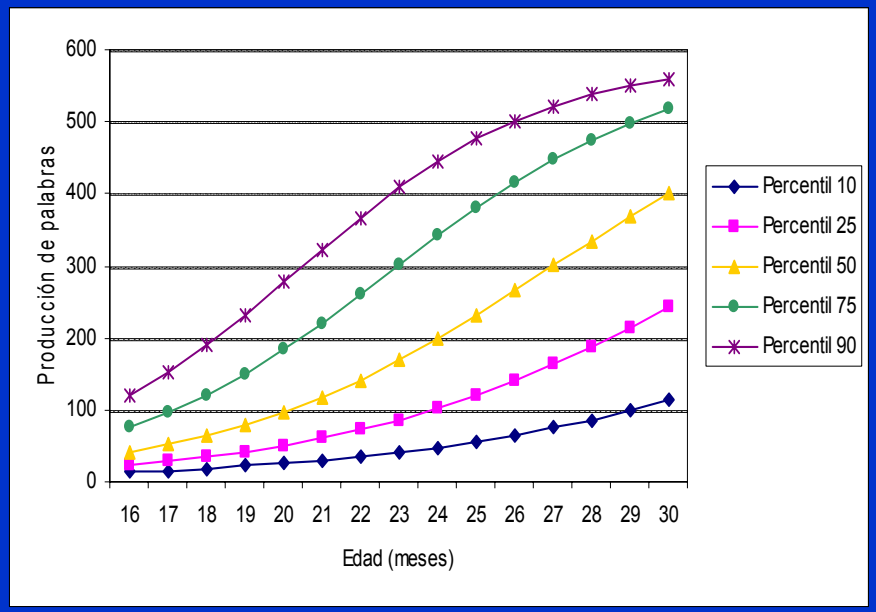


Fig. 1. Vocabulary production scores (IA) for children 16, 19, 22, 25, and 28 months old. Median values, and 10th, 25th, 75th, and 90th percentile scores. (Maximum score = 710.)

Berlund & Eriksson, 1998



Spanish: López Ornat et al., 2005

- => doubts about the instrument's ability to predict early language delays & problems of ***'false positives'.***

Exploring the use of Spanish MCDI as early detector of at-risk cases in language depelopment

A first step => studying the influence of psychosocial variables on low scores in the MCDI-2 (16-30 months of age).

Main variables: sex, age, contact with other languages.

Other variables: born before term, birth order, who is the main childminder, schooling, mother's level of studies.

Method: (I) Sample

N = 593 subjects;

Ages (16 to 30 months);

Gender distribution (50% boys/ 50% girls);

78.05 % monolingual Spanish; 21% contact with other language *(mainly catalan, euskera & galician).*

Birth order:

- First-born (59.5%)
- Second-born (33%)
- Other (7.6%)

Method: (II) Procedure

- The full sample was divided in 4 groups depending on percentiles in **vocabulary production**, as follows:
  - **low percentiles** => 0 to 25 **(PC0-25)**
  - **medium-low percentiles =>** 26 to 50 **(PC26-50)**
  - **medium-high percentiles =>** 51 to 75 **(PC51-75)**
  - **high percentiles =>** 76 to 99 **(PC76-99)**

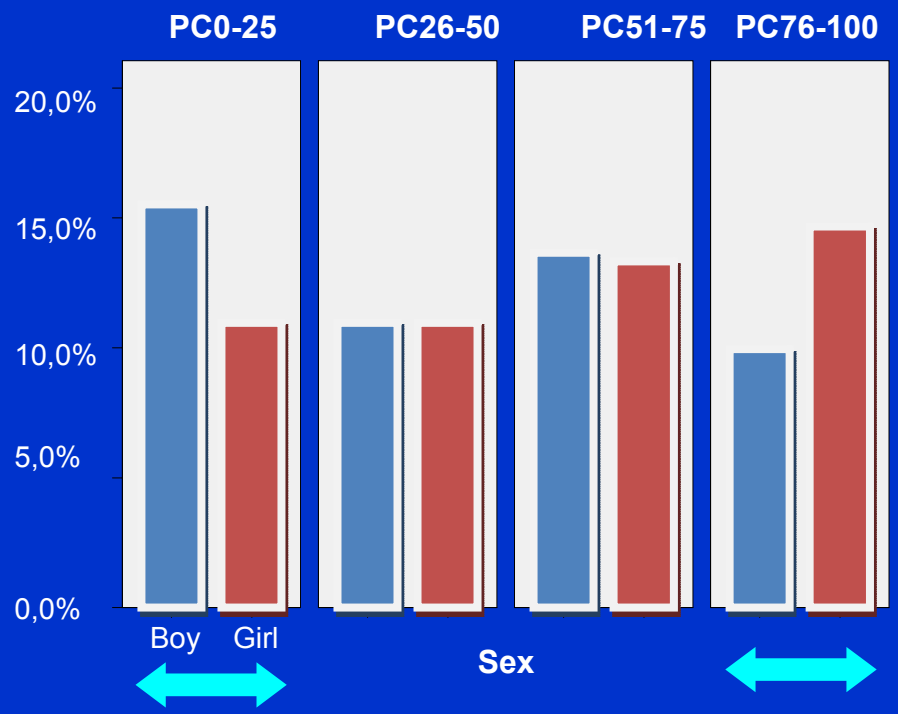
  So, for example, subjects in percentiles 51-75 were grouped together independently of their chronological age.

** **For some analysis a group with very low percentiles =>** 0 to 10 **(PC0-10) was considered.**

Method: (III) Results

3.1.- The influence of sex:

Distribution (%) of boys/girls as a function of percentile group



Distribution (%) of boys/girls WITHIN each percentile group

			PC0-25	PC26-50	PC51-75	PC76-100	TOTAL
Sex	BOYS	Nº of cases/ (%)	92 **58.6%**	65 (50%)	81 (50.6%)	**59 40.4%**	297 50.1%
	GIRLS	Nº of cases/ (%)	65 **41.4%**	65 (50%)	79 (49.4%)	**87 59.6%**	296 49.9%
Total		Nº of cases/ (%)	157 (26.5%)	130 (21.9%)	160 (27%)	146 (24.6%)	593 100%

$\chi 2=10,37$ d.f.=3 $p<.018$

=> differences are due to differences in the extreme percentile groups

Method: (III) Results

3.1.- The influence of sex: more analyses ...

** ANOVAs for each percentile group, taking sex as IV and Vocabulary Scores as DV:

ANOVA

Vocab025

	Suma de cuadrados	gl	Media cuadrática	F	Sig.
Inter-grupos	15962,871	1	15962,871	8,801	,003
Intra-grupos	281122,607	155	1813,694		
Total	297085,478	156			

ANOVA

Vocab2651

	Suma de cuadrados	gl	Media cuadrática	F	Sig.
Inter-grupos	14819,569	1	14819,569	1,371	,244
Intra-grupos	383105,354	128	10805,511		
Total	397924,923	129			

ANOVA

Vocab5175

	Suma de cuadrados	gl	Media cuadrática	F	Sig.
Inter-grupos	20224,764	1	20224,764	1,290	,258
Intra-grupos	477201,480	158	15678,490		
Total	497426,244	159			

ANOVA

Vocab76100

	Suma de cuadrados	gl	Media cuadrática	F	Sig.
Inter-grupos	74549,068	1	74549,068	4,263	,041
Intra-grupos	518324,391	144	17488,364		
Total	592873,459	145			

** Confirmation of differences in sex distribution; boys have more probabilities of belonging to the lowest percentile group using vocabulary scores as measurement.

Method: (III) Results

3.1.- The influence of sex: more analyses ...

** ANOVAs for each percentile group, taking sex as IV and Grammar Complexity Scores as DV:

ANOVA

commorfPC025

	Suma de cuadrados	gl	Media cuadrática	F	Sig.
Inter-grupos	891,695	1	891,695	5,640	,019
Intra-grupos	24505,554	155	158,100		
Total	25397,248	156			

ANOVA

commorfPC2650

	Suma de cuadrados	gl	Media cuadrática	F	Sig.
Inter-grupos	329,608	1	329,608	,728	,395
Intra-grupos	57920,892	128	452,507		
Total	58250,500	129			

ANOVA

commorfPC5175

	Suma de cuadrados	gl	Media cuadrática	F	Sig.
Inter-grupos	2463,421	1	2463,421	3,923	,049
Intra-grupos	99214,323	158	627,939		
Total	101677,744	159			

ANOVA

commorfPC76100

	Suma de cuadrados	gl	Media cuadrática	F	Sig.
Inter-grupos	3383,057	1	3383,057	4,748	,031
Intra-grupos	102598,778	144	712,492		
Total	105981,836	145			

** Again ... boys have more probabilities of belonging to the lowest percentile group (using grammar complexity as measurement).

Method: (III) Results

3.1.- The influence of sex: more analyses ...

** ANOVAs for each percentile group, taking sex as IV and VOCALIZATION Scores as DV:

ANOVA

		Suma de cuadrados	gl	Media cuadrática	F	Sig.
vocal025	Inter-grupos	31,474	1	31,474	7,061	,009
	Intra-grupos	690,895	155	4,457		
	Total	722,369	156			
vocal2650	Inter-grupos	,000	1	,000	,000	1,000
	Intra-grupos	627,508	128	4,902		
	Total	627,508	129			
vocal5175	Inter-grupos	8,460	1	8,460	1,026	,313
	Intra-grupos	1302,734	158	8,245		
	Total	1311,194	159			
vocal76100	Inter-grupos	26,104	1	26,104	2,501	,116
	Intra-grupos	1503,273	144	10,439		
	Total	1529,377	145			

Vocalizations are very early and basic activities related to C & L.

Conclusions: the influence of sex

=> Results are coherent with the assumption of an earlier development in girls.

=> Results are coherent with empirical evidence on the higher probability for boys to be (at least) 'late bloomers':

- *=> along the full Spanish CDI sample, and independently of age, boys have more probabilities to be in lower percentiles (PC0-25) than girls, and girls have more probabilities of being in higher (PC76-100) percentiles than boys.*
- *=> for intermediate percentiles the probabilties are similar for boys and girls.*

Method: (III) Results

3.2.- The influence of age:

Distribution (%) of ages WITHIN each percentile group

			PC0-25	PC26-50	PC51-75	PC76-100	TOTAL
AGE months	16-18	Nº of cases / (%)	**68 43.3%**	26 20%	16 10%	**18 12..3%**	128 (21.6%)
	19-21	Nº of cases / (%)	31 19.7%	25 19.2%	26 16.3%	22 15.1%	104 (17.5%)
	22-24	Nº of cases / (%)	26 16.6%	23 17.7%	39 24.4%	35 24%	123 (20.7%)
	25-27	Nº of cases / (%)	19 12.1%	23 17.7%	40 25%	36 24.7%	118 (19.9%)
	28-30	Nº of cases / (%)	**13 8.3%**	33 25.4%	39 24.4%	35 24%	120 (20.2%)
	TOTAL		157	130	160	146	**593**

43.3% of children under PC25 are 16 to 18 months-old ...

... but only 12.3% of children over PC75 are these ages

Method: (III) Results

3.2.- The influence of age: distribution of percentiles per age group

			PC0-25	PC26-50	PC51-75	PC76-100	TOTAL
AGE months	16-18	Nº of cases/ (%)	**68 53.1%**	26 20.3%	16 12.5%	**18 14.1%**	128 (100%)
	19-21	Nº of cases/ (%)	31 29.8%	25 24%	26 25%	22 21.2%	104 (100%)
	22-24	Nº of cases/ (%)	26 21.1%	23 18.7%	39 31.7%	35 28.5%	123 (100%)
	25-27	Nº of cases/ (%)	19 16.1%	23 19.5%	40 33.9%	36 30.5%	118 (100%)
	28-30	Nº of cases/ (%)	**13 10.8%**	33 27.5%	39 32.5%	**35 29.2%**	120 (100%)
	TOTAL		157 26.5%	130 21.9%	160 27%	146 24.6%	**593** 100%

** Between 16 & 18 months, 53% of children are in the lowest percentiles (PC0-25)

** But only 14% of these children are in the highest percentiles (PC76-100)

OPPOSITE TENDENCY FOR AGES 27-30

Method: (III) Results

3.2.- The influence of age: 'breaking down' PC0-25 in PC0-10 & PC11-25

			PC0-25
AGE months	16-18	Nº of cases/ (%)	**68 43.3%**
	19-21	Nº of cases/ (%)	31 19.7%
	22-24	Nº of cases/ (%)	26 16.6%
	25-27	Nº of cases/ (%)	19 12.1%
	28-30	Nº of cases/ (%)	**13 8.3%**
	TOTAL		157

		PC0-10	PC11-25
AGE months	16-18	**41 32.%**	27 21.1%
	19-21	16 15.4%	15 14.4%
	22-24	9 7.3%	17 13.8%
	25-27	4 3.4%	15 12.7%
	2830	4 3.3%	9 7.5%
	TOTAL	74	83

** The highest percentage of 16-18 months old children (32%) is under the lowest percentile (PC10).

Method: (III) Results

3.2.- The influence of age: more analysis ...

** For PC0-10 & PC11-25 => differences per age groups are significant (χ2=66.72 d.f.=4 p<.000; χ2=70.7 d.f.=4 p<.000) => *more young children in low percentiles.*

** For PC26-50 => differences per age groups are not significant (χ2=3.80 d.f.=4 p<.434).

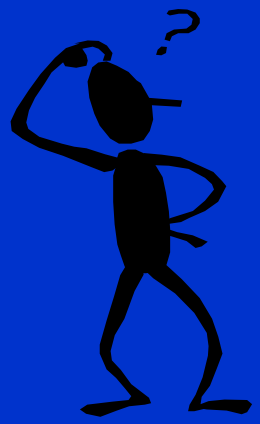
** For PC51-75 & PC76-100 => differences per age groups are again significant (χ2=19.5 d.f.=4 p<.001; χ2=12.87 d.f.=4 p<.012) => *more old children in high percentiles.*

So, again ***differences are due to differences in the extreme percentile groups***

Conclusions: the influence of age

** Children do not distribute homogeneously in percentile groups according to their age:

=> **When CDI-2 starts at 16 months of age**, there is a higher percentage of young children (16-18 m.) in the lowest percetiles.



*** How to interpret this result???*

1.- Flaw in the measure: for the lowest ages the inventory (CDI-2) does not discriminate adequately (floor effect?).

1'.- 'Late bloomers' can make the percentage of low percentiles increase in the youngest ages, while these numbers would decrease progresively as children get older.

A consequence of the previous results ...

... the need for follow-up studies of children in the lowest percentages

Method: (III) Results

3.3.- Contact with other languages:

CONTACT		PC0-25	PC26-50	PC51-75	PC76-100	TOTAL
NO	Nº of cases/ (%)	109 24.3%	96 21.4%	123 27.5 %	120 26.8%	448 100%
YES	Nº of cases/ (%)	48 33.1%	34 23.4%	37 25.5 %	26 17.9%	145 100%
Total	Nº of cases/ (%)	157 (26.5%)	130 (21.9%)	160 (27%)	146 (24.6%)	593 100%

** (χ2=7.029 d.f.= 3 p<.071) =>

RELATIONSHIP BETWEEN CONTACT WITH OTHER LANGUAGES AND PC GROUP IS NOT SIGNIFICANT , but it approximates to it.

** Partial analysis for PC0-25 (χ2=4,331 d.f.= 1 p<.037) and PC76-100 (χ2=4,628 d.f.= 1 p<.031) show that the differences are significant.

Conclusions: contact with other languages

** At these ages (16-30 m.) and for the Spanish language contact with other languages has only an influence on the extremes of the distribution (lowest and highest percentiles).

** At these ages contact with other languages slightly increases the probability of having a low performance and decreases the probability of having a good performance, but it does not have any influence on "intermediate" percentiles (PC25-75).

Method: (III) Results

3.4.- The effect of other variables:

** ***Born before term**, birth order, who is the main childminder, schooling and mother's level of studies DO NOT SHOW any significant effect on the percentile distribution.*

Pre-term children under 2.100 g. were not included in the Spanish sample.

** other studies with pre-term children (Molero & Mariscal, 2007) show significant effects, mainly with very low weigth children.

RESEARCH in course….

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- More controlled and extensive study about screening possibilities of CDI & of predictive validity:
  - 120 subjects of different ages, measured with CDI-1, CDI-2 and a standarized test (PLON) for children of 3 years of age.

WORK pending....

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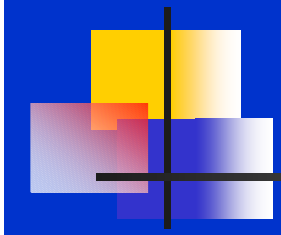
- Short-versions of CDI-1 and CDI-2 (2 short versions already developed, forms A and B): standarization for pediatric uses .... pending.



THANK-YOU!!

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